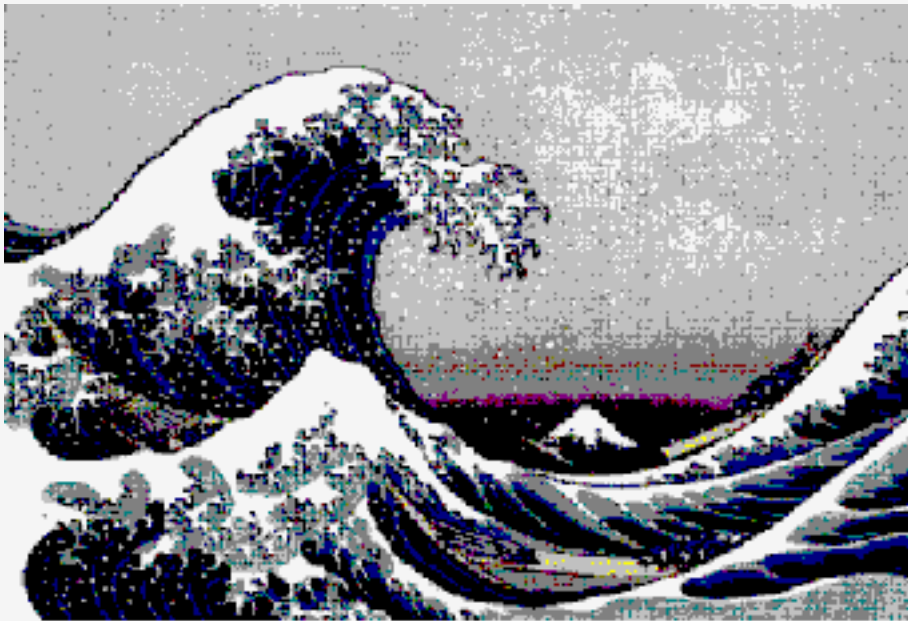




Activity 6: Tsunami Effects in Africa



A tsunami is a huge sea wave caused by earthquakes or other large-scale disturbances of the ocean floor. They are sometimes incorrectly referred to as tidal waves.

In this exercise, you will examine the location of earthquakes that have caused tsunamis effects in Africa and the effects of these tsunamis. The distance between tsunami source locations and tsunami effect locations will be determined using ArcView GIS.

Note: New ArcView instructions will be explained in this Activity. Please refer to activities 1 through 5 for ArcView instructions that you have already completed in those exercises.

ArcView Steps

Step 1

Start ArcView.



Open your Africa.apr project in the Student Temporary workspace.

Add a new view to the project:



New

Set the Working Directory to the same directory you selected in Activity 1 to save your work.

Step 2 Rename and Define Your New View.

Choose Properties from the View pull down menu, and rename the view to "Tsunami Effects in Africa". Select "decimal degrees" from the Map Units pull down list. Select "kilometers" from the Distance Units pull down list. Click on Projection and check to make sure the Category is "Projections of the World" and the Type is "Geographic". Click OK.

Step 3 Add Data to the View.

Add the following themes to the view from your computer's Africa directory:

t_source.shp - contains locations of earthquakes that have triggered tsunamis in Africa.

t_effect.shp - contains location and damage information for cities in Africa that have

experienced effects from tsunamis.

For every Tsunami Source point there should be at least one Tsunami Effect point. For some of the events the tsunami affected more than one location.

Add the following themes to the view from the same directory as before:

country.shp - Outlines of countries in Africa.

cities.shp - Cities in Africa with over 15,000 people.

Step 4 Rename the Themes

Under "View" --> "Properties":

Rename the t_source.shp theme to Tsunami Sources

Rename the t_effect.shp theme to Tsunami Effects

Rename the country.shp theme to Countries

Rename the cities.shp theme to Cities


Save your project!

Step 5 Display the Cities Theme as a Graduated Symbol

Double-click on the Cities theme to bring up the Legend Editor.
In the Legend Editor window select "Graduated Symbol" as the Legend Type.
Select "Population" for the Classification Field.
Change the color of the circles to a dark purple.
Click Apply in the Legend Editor to apply your changes to the view.
Leave the Legend Editor open.


Step 6 Display the Tsunami Effects as Bright Blue Stars

Double-click on the Tsunami Effects theme to bring up the Legend Editor.

Click on the thumbtack icon to bring up the Marker Palette .

Symbolize the earthquakes with a star. There are two stars--select the star that is filled with green.

Change the size to 14.

Click on the paintbrush icon to bring up the Color Palette .

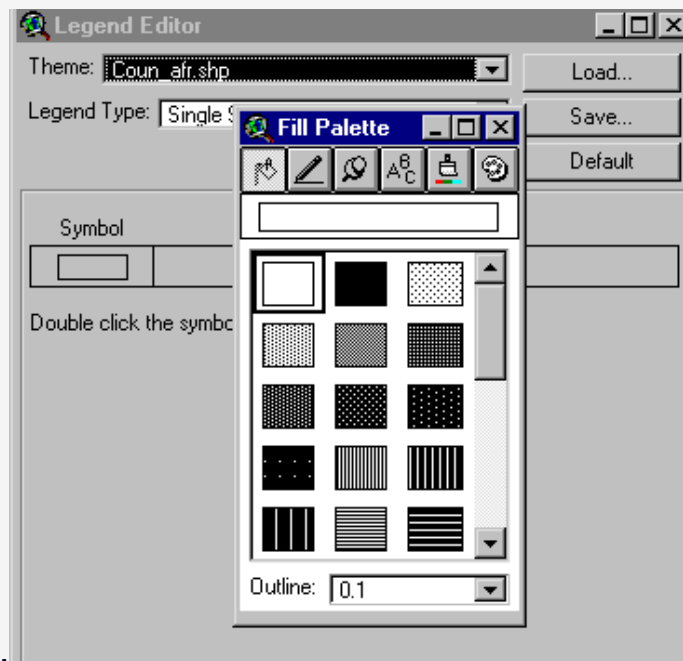
From the Color Palette choose a light blue color.

Click Apply in the Legend Editor to apply your changes to the view.
Leave the Legend Editor open.

Step 7 Change the Colors, Sizes, and Symbols of the Themes

Change the colors, sizes, and symbols of the themes below:


Countries theme: Make the theme transparent. Do this via the Legend



Editor, Select the paint bucket

icon.  and select the upper left (white) box. Click Apply.

In the same manner, Enter the Legend Editor for the Tsunami Sources theme.

Access the marker symbol  and change the size to 8 and the color to red.

Step 8 Arrange the Themes in the View Window

Arrange the themes in your view window in the following order:

- Tsunami Sources
- Tsunami Effects
- Cities
- Countries


Step 9 Display the Themes in the View

Click on the raised box to the left of the Theme names to make a check mark and see the coverages displayed in the View window.

You may want to turn off one or more themes in order to view the distribution of a particular theme. You may need to maximize or resize the ArcView window and the View window to see the entire view.

Step 10 Determine the Distance between two Points

One of the tools provided by a GIS is the ability to determine distance on a map by clicking on two different points.

To measure the distance between the Tsunami Effect locations on the northwest coast of Africa, click on the Measure Distance button  in the lower tool bar.

When you move the arrow over the view it should turn into a symbol with crosshairs. Click once on a point and move the symbol to another point and click twice.

A display in the lower left corner should appear giving you the distance between the points. The distance between the two points should be approximately 534 km.

Step 11 Create and Print a Layout


Prepare of Layout of Tsunami Effects, Tsunami Sources, Cities and Countries.

Arrange the themes in your view window in the following order:


- Tsunami Sources
- Tsunami Effects
- Cities
- Countries

Save your project!

Questions

- Question 1** Use the Information button  to name the two cities and the two countries with a population greater than 2 million that you believe to be most at risk from a tsunami in Africa.
- Question 2** Why do you believe these two cities and two countries are most at risk? Defend your answer.
- Question 3** What other cities over 2 million in population have a risk of tsunamis in Africa?
- Question 4** Make the Tsunami Sources theme the active theme and zoom to the extent of that theme. Examine the source in the Atlantic Ocean northwest of the coast of Morocco. During what year did it occur? How far was the earthquake from where the tsunami struck the shore?
- Question 5** If the same earthquake struck today, name all of the coastal cities in Algeria and Morocco that could be affected.
- Question 6** What is the combined population of the coastal cities in Algeria and Morocco that could be affected? Show your work.

Question 7

Use the Open Theme Table Button  to open both the Tsunami Effects table and the Tsunami Sources table. Arrange the two tables next to each other so that you can compare the dates in the two tables.

By comparing the two tables, determine which Tsunami Sources caused Tsunami Effects in more than one location. Leave the tables open for the next question.

Question 8

Which tsunamis actually caused some type of damage?

Question 9

When an earthquake causes a disturbance in a lake rather than in the ocean it is called a "seiche".

Determine the date and name of the city and country where the Tsunami Effect was a seiche rather than a tsunami.

Question 10

How do you know that this was a seiche rather than a tsunami?

[U.S. Department of the Interior](#)

[U.S. Geological Survey](#)

[Rocky Mountain Mapping Center](#)

URL: <http://rockyweb.cr.usgs.gov/outreach/africa/act6.html>

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